CALS TEST NETWORK

CTN Test Report 90-018

UCRL-ID-104023

Raster Data Transfer Test Using GTX Produced Data: MIL-R-28002 Type I (Raster)

Quick Short Test Report

June 14, 1990

DTIC QUALITY INSPECTED

Prepared for
Air Force Logistics Command
AITI Project

Lawrence Livermore National Laboratory

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1 Background and Test Objectives

The DoD Computer-aided Acquisition and Logistics Support (CALS) Test Network (CTN) is conducting tests of the military standard for the Automated interchange of Technical Information, MIL-STD-1840A, and its companion suite of specifications. The CTN is a DoD sponsored confederation of voluntary participants from industry and government, managed by the Air Force
Logistics Command.

The primary purpose of the CTN is to evaluate the effectiveness of the CALS standards for technical data interchange and to demonstrate the capability and operational suitability of these standards.

To this end, testing should represent the systems and applications in use by a large number of participants. Sampling a wide cross section of industry and government will gain feedback on the various interpretations of the standards and broaden the base of industry participation in the CALS initiative.

This test was conducted to allow GTX to demonstrate their ability to generated a MIL-R-28002 data file. The objective was to evaluate their interpretation of the MIL-R-28002 standard thereby assist the CTN in substantiating the validity of the standards or recommending changes to these standards and the references to national or international standards.

Additionally, Quick Short Test Reports (QSTRs) are intended to promote industry and government participation in the CALS initiative, developing a level of confidence in the technology and furthering mission objectives.

2 Test Parameters

Test Plan:	Informal data exchange between LLNL Weapons Engineering Division (WED) and GTX.
Date of Evaluation:	April 27, 1990
Evaluator:	Lawrence Livermore National Laboratory P.O. Box 808, L-542 Livermore, CA 94550
Data Originator:	GTX 8836 North 23rd Avenue Phoenix, AZ 85021
Data Description:	Three (3) MIL-R-28002 Type I files written to an IBM PC 5.25" floppy disk.
Data Source System:	GTX-400 Scanner GTX Recognition Module (RM) IBM PC 386
Evaluation Tools Used:	IBM PC-AT, MS-DOS SUN 3/60, UNIX CALS Tool Box "calstb.350"
Standards Tested:	MIL-STD-1840A Notice 1 (1840A) MIL-R-28002 Type I (28002) Amendment 1

3 1840A Analysis

Data was delivered on a 5.25" floppy disk, precluding any 1840A test of the transfer media or transfer format. Since MIL-STD-1840A currently only addresses 9-track magnetic tape as an exchange medium, no 1840A analysis could be conducted.

Image orientation was not considered an issue during this test. The MIL-R-28002 documentation is ambiguous in its definition of the orientation parameter. The intent of specifying raster image orientation (header record 8 "rorient:") is to allow the receiving system to render a right reading image. Images may be scanned in any orientation; it is the responsibility of the system which generates the image to indicate, through the orientation parameter, which direction the pixel path and scan line progressions are to take.

3.1 1840A External Packaging

Not applicable to this test.

3.2 Transmission Envelope

Not applicable to this test.

3.2.1 Tape Formats

Not applicable to this test.

3.2.2 Declaration Files

No declaration file was delivered with the data files.

4 Raster Analysis

MIL-STD-1840A references ANSI x3.27 for magnetic tape labeling and file structure. X3.27 6.3.4 specifies "Blocks within a file are padded out to the desired length by the use of 'circumflex accent' characters.....". All the files in this test used "space" characters. However, since the data was not transferred by magnetic tape, the requirement is not applicable.

4.1 FILE "case1c.g4"

4.1.1 File Header Records (MIL-R-28002)

1840A header data
srcdocid: NONE
dstdocid: NONE
txtfilid: NONE
figid: NONE
srcgph: NONE
doccls: NONE
rtype: 001
rorient: 090,270
rpelcnt: 013944,018068
rdensty: 0400
notes: GTX Corporation
8836 north 23rd Ave
Phoenix Arizona
(602)-870-1696 Copyright 1989

4.1.2 File Structure (MIL-R-28002)

file size: 436176 bytes
header size 2048: valid header length
record size 128: valid fixed length records
header padding (^^^...): N/A

First line encoding: Valid CCITT T.6 encoding
octal 171003 160076 001740
binary 1111001000000011 1110000000111110 0000001111100000
T.6 1111
vertical(0) four times
001
horizontal
000000011 111
make-up(2560)
000000011111
make-up(2560)
0 00000011111
make-up(2560)

End-of-file mark: Valid CCITT T.6 end-of-file mark
octal 016000 040004
binary 000111000000000010000000000100
T.6 000000000001000000000001
EOF

4.1.3 Image Presentation (CCITT Group-4)

decompression: The file decompressed without indicating code errors. The image did not display due to CTN test bed system memory fault. The current CTN test best bed is not capable of displaying a bitmap of this size.

4.2 FILE "case2c.g4"

4.2.1 File Header Records (MIL-R-28002)

srcdocid: NONE
dstdocid: NONE
txtfilid: NONE
figid: NONE
srcgph: NONE
doccls: NONE
rtype: 001
rorient: 000,270
rpelcnt: 006464,005584
rdensty: 0400
notes: GTX Corporation
8836 north 23rd Ave
Phoenix, Arizona 85021
(602)-870-1696 Copyright 1989

4.2.2 File Structure (MIL-R-28002)

header size 2048: OK
record size 128: OK
header padding (^^^...): N/A

First line encoding: Valid CCITT T.6 encoding
octal 177777 177777 177777
binary 111111111111111 111111111111111 111111111111111
T.6 vertical(0) forty eight times

End-of-file mark: Valid CCITT T.6 end-of-file mark
octal 174000 100010
binary 1111100000000000 1000000000001000
T.6 00000000000 1000000000001
EOF

4.2.3 Image Presentation (CCITT Group-4)

decompression: The file decompressed without code errors and an image of a scanner target was displayed. The image was horizontally oriented with the top edge to the right.

image centered: The image was centered in the display format.

orthographic alignment: The image was orthogonaly aligned with the presentation frame, with no apparent rotation or skew. Parallel lines appeared linear with no perceptible image distortion.

cropping: The image appeared complete and in tact.

image continuity: Presented in landscape format, the image appeared to be complete with no obvious dropouts or misalignments due to scanner registration or data read errors.

4.3 FILE "case3c.g4"

4.3.1 File Header Records (MIL-R-28002)

1840A header data
srcdocid: NONE
dstdocid: NONE
txtfilid: NONE
figid: NONE
srcgph: NONE
doccls: NONE
rtype: 001
rorient: 000,270
rpelcnt: 004928,004209
rdensty: 0400
notes: GTX Corporation
8836 north 23rd Ave
Phoenix Arizona 85021
(602)-870-1696 Copyright 1989

4.3.2 File Structure (MIL-R-28002)

file size: 299070
header size 2048: OK
record size 128: OK
header padding (^^^...: N/A

First line encoding: Valid CCITT T.6 encoding
octal 177777 176200 175466
binary 1111111111111111 1111110010000000 1111101100110110
T.6 1111111111111111 111111
vertical(0) twenty two times
001
horizontal
0000000 11111
make-up(2560)
011001101-
make-up

End-of-file mark: Valid CCITT T.6 end-of -file mark
octal 177400 010001
binary 1111111100000000 0001000000000001
T.6 00000000 0001000000000001
EOF

4.3.3 Image Presentation (CCITT Group-4)

decompression: The file decompressed without coding errors. An image of a PM-189 scanner target was displayed. The image was horizontally oriented with the top edge to the right.

image centered: The image was centered in the presentation format.

orthographic alignment: The image appeared to be orthogonaly aligned with in the presentation frame. There was no apparent rotation or skew. Parallel lines appeared to be linear and the aspect ratio appeared reasonable, with no obvious distortion.

cropping: Although present without a border, the image was centered and completely displayed within the presentation format.

image continuity: The image appeared to be complete with no obvious dropouts or misalignments due to scanner registration or read errors. The image was clean, with good contrast and line definition.

5 Conclusions and Recommendations

Three MIL-R-28002 files were transferred to the CTN on IBM formatted floppy disks. Two of the images were flawed. One image displayed an anomaly that, from its occurrence, rendered the rest of the image unintelligible. Since no coding errors occurred during data expansion and no obvious coding errors were encountered while hand decoding the beginning of the image file, it would appear that either encoding algorithm has a bug or the original bit maps of the images are flawed.

A third image exhibited a minor anomaly, one normally associated with scanner misalignment. A section of this image was not registered correctly along the horizontal viewing axis. The scanner registration error is not uncommon but can lead to ambiguities in images representing engineering drawings, especially schematics and wiring diagrams. This type of error pertains more to QA and operations than to the CALS standards. However QA is an important part of the imaging process and should be address as part of any raster implementation.

Although CALS does not presently specifies the interchange of data on floppy disks, the standard does not preclude this option in the future. The CALS standard could have been more accurately paralleled in the creation of the floppy disk by the addition of a declaration file as per MIL-STD-1840A "5.5.1 Declaration file". Additionally, the data file names should have been implemented as per MIL-STD-1840A "5.1.3 Data file name".

GTX padded the empty area between the last header record and the beginning of the group-4 image data with "space" characters. This deviation from MIL-STD-1840A is analogous to the same issue covered in UCRL-ID-104021.

MIL-STD-1840A does not specify the character to use for padding. A vendor implementing a system which creates MIL-R-28002 files on other media such as magnetic disks is free to chose an appropriate character. When writing tape however, a vendor is required to use circumflex accent characters as required by ANSI X3.27.

MIL-STD-1840A (5.2.1.6 Raster files) should state "All the data header records shall be written in the first physical block of the file, with the block padded to the appropriate size by records filled with the "space" character.

The file structure of the MIL-R-28002 test files sent to the CTN on floppy disk, indicates that GTX can produce raster data files compatible with the CALS initiative.